

MEMO

Project: TS106, Northside Dr at Riverview/Old Powers Ferry Roundabout

Date: 4 March 2021

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Background

This memo will provide an in depth look into the Federal Highway Administration (FHWA) guidance and data for single-lane roundabouts compared with the design decisions made for the Northside Dr at Riverview/Old Powers Ferry roundabout. It will also look into the difference between traffic circles, as seen in Washington D.C., and a modern single-lane roundabout.

Traffic Circles v. Modern Roundabouts

There are many differences between modern roundabouts and traffic circles. Traffic circles are much larger than modern roundabouts as shown by the figure below. The traffic circle is depicted in green and the roundabout in grey. Dupont Circle in Washington, D.C. is an example of an older-style traffic circle. Traffic circles have straight access to the circle and do not have to yield to traffic already in the circle.

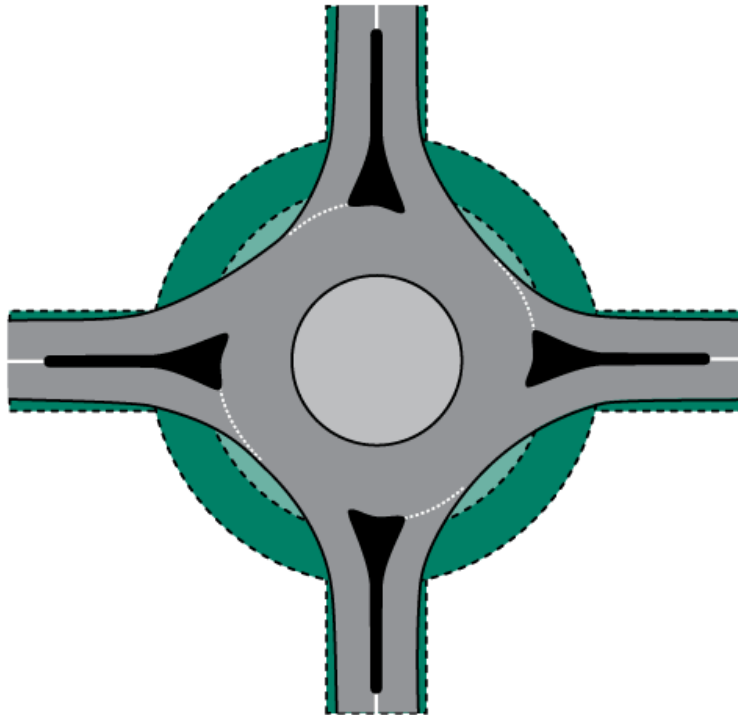


Figure 1 Traffic Circle v. Roundabout

²https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/presentations/safety_aspects/long.cfm

³<https://safety.fhwa.dot.gov/provencountermeasures/roundabouts/>

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<https://wsdot.wa.gov/Safety/roundabouts/BasicFacts.htm#:~:text=Traffic%20circles%2C%20or%20rotaries%2C%20are,signals%20within%20the%20circular%20intersection>

Modern roundabouts are designed to accommodate vehicles of all sizes. Drivers enter the roundabout at a gently curved angle to reduce speed. Drivers also yield to traffic already in the roundabout before entering.⁴

FHWA Guidance as it Relates to the Proposed Project

Roundabouts should be considered under a wide range of conditions. Of the list provided by the FHWA, the following conditions were considered when determining if a roundabout would be most advantageous for the Northside Dr at Riverview/Old Powers Ferry intersection.

- Intersections with high crash rates/high severity rates
- Intersections with at least 4 approaches
- Replacement of all-way stops
- Where aesthetics are important
- Where accommodating older drivers in an objective

Safety Improvements

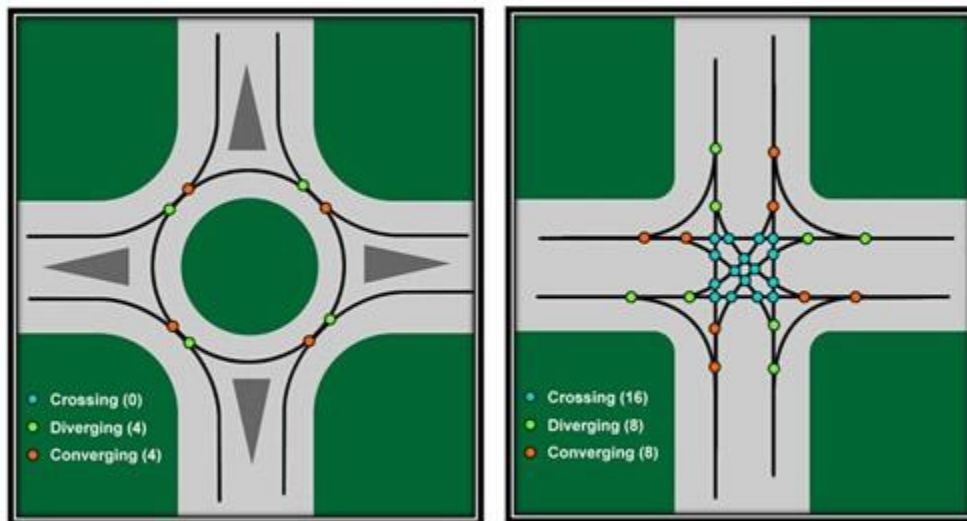


Figure 2 Vehicle Conflict Points

The diagrams in figure 1 point out the difference in vehicle conflict points at a one-lane roundabout (8 conflicts) and a 4-leg intersection (32 conflicts). A roundabout has zero vehicle crossing conflict points as opposed to 16 at a 4-leg intersection. This is where most of the safety benefits arise.

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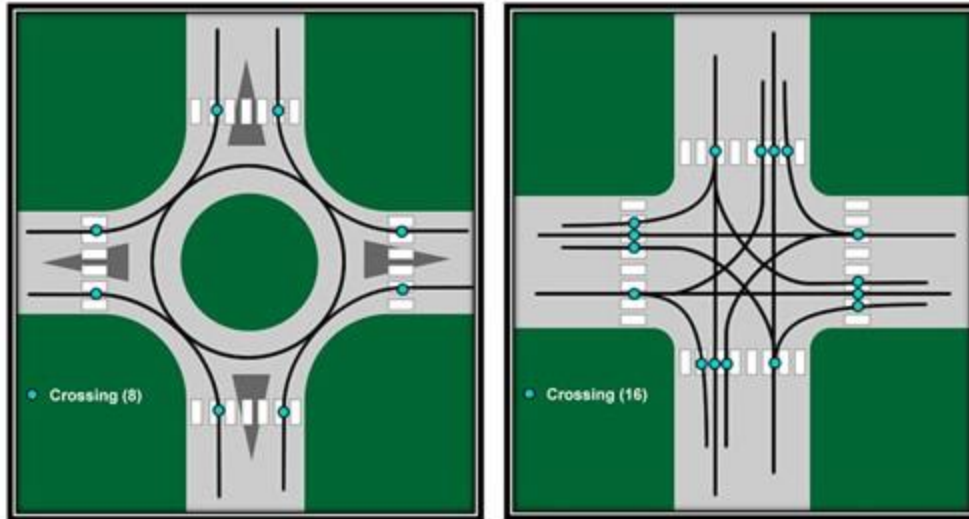


Figure 3 Pedestrian Conflict Points

Because of the lower vehicle speeds (less than 25MPH), pedestrians have a lower risk of navigating roundabouts than a typical intersection. “A pedestrian has an 85% chance of being killed by a vehicle traveling at 45MPH. That drops to 15% when the vehicle is traveling at 20MPH. There are also less conflict points...”² The diagrams in figure 2 point out the difference in pedestrian conflict points at a one-lane roundabout (8 conflicts) and a 4-leg intersection (16 conflicts). Although a roundabout is a more active interaction, pedestrians are generally safer at roundabouts due to the crossing locations being set further back from the yield line and shorter travel distances across the roadway (splitter islands between lanes).

Angle and left turn crashes at a typical 4-leg intersection account for 63% of fatal crashes. Rear-end crashes are another type of crash that is often a problem at intersections. However, these types of crashes are usually less severe than the other two types of crashes. Right angle crashes are typically the most severe because of the speed differential of the two vehicles. One vehicle is typically just starting to accelerate from a stop (< 5 mph), the other vehicle is typically going through the intersection at or above normal operating speeds for that street (perhaps 30-50 mph). At a roundabout, vehicles are traveling at a significantly lower speed (<25 mph). Crashes that occur will be less severe because of this reduced speed differential and the more “sideswipe” nature of crashes.

The proposed roundabout is a safety measure. The Federal Highway Administration considers the roundabout to be one of the best safety improvements available in a number of situations³. The crash rate at the Northside Dr at Riverview/Old Powers Ferry intersection is high. The crash data that has been collected by the City of Sandy Springs shows that crashes are not declining. A traffic study was performed in January 2018 for this intersection. The data indicated that 12 crashes occurred at the study intersection within a 5-year period (2013-2017). Rear end crashes accounted for half of the total crashes. The roundabout will eliminate potential vehicle conflict points, reducing crashes.

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Table 1 Crash Data from 2018 Traffic Study

Collision Type	Year					
	2013	2014	2015	2016	2017	Total
Angle	2	1	-	1	1	5
Head-On	-	-	-	-	-	-
Rear End	2	-	2	1	1	6
Sideswip	-	-	-	-	1	1
Not a Collision with Motor Vehicle	-	-	-	-	-	-
Unknown	-	-	-	-	-	-
Total	4	1	2	2	3	12
Total Non-Fatal Injuries	1	1	-	-	-	2
Total	-	-	-	-	-	-
Average Crashes (per year)						2.4
HSM Predicted Crashes (per year)						1.9

For a roundabout to operate satisfactorily, a driver must be able to enter the roundabout, move through the circulating traffic, and separate from the circulating stream in a safe and efficient manner. To accomplish this, a driver must be able to perceive the general layout and operation of the intersection in time to make the appropriate maneuvers. Adequate lighting should therefore be provided at all roundabouts. The proposed design provides adequate lighting around the perimeter of the roundabout to meet the FHWA recommended street illumination levels. This improves the visibility of the central island and the visibility of circulating vehicles to vehicles approaching to the roundabout.

The overall concept for roundabout signing is similar to general intersection signing. Proper regulatory control, advance warning, and directional guidance are required to avoid driver expectancy related problems. The City of Sandy Springs has followed MUTCD standards for roundabout signage in the design. A few of the regulatory signs included in the project are roundabout ahead and reduced speed signs placed on all four legs of the roundabout far enough in advance to prepare drivers for the changing condition. There will be yield signs placed at each entrance point as well as one-way signs to establish the direction of flow of traffic within the roundabout.

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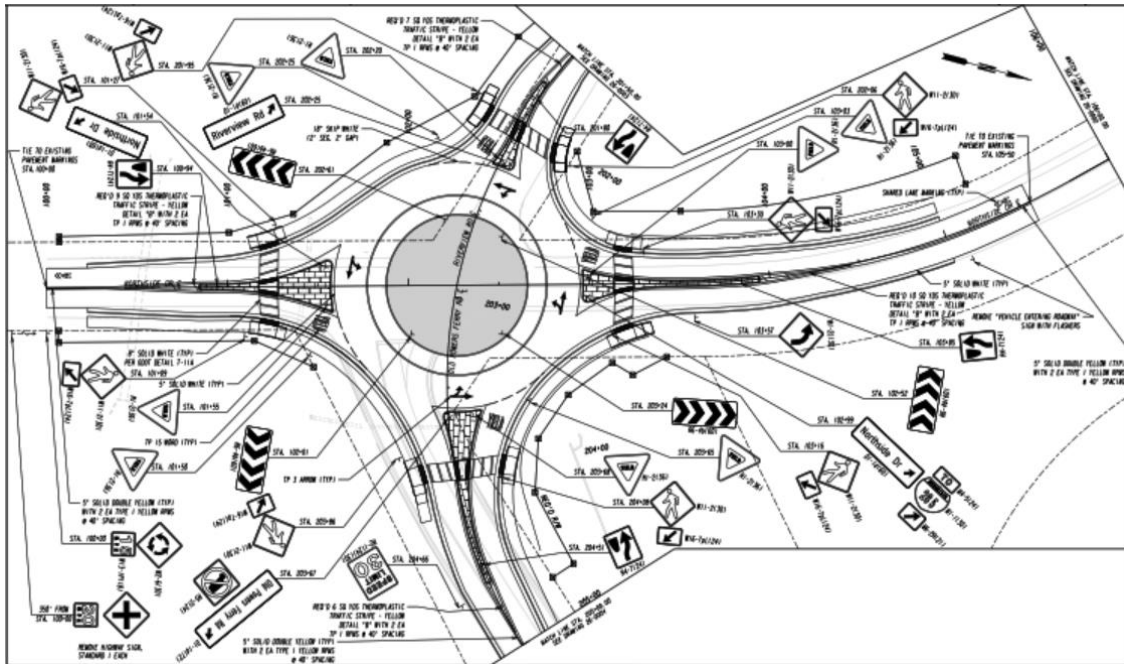


Figure 4 Snip of Signage from the Proposed Plans

The proposed roundabout also decreases the queuing during peak hours. The adjacent intersections are far enough away from the proposed project that the installation of a roundabout will not increase the queuing at these intersections. The channelized islands on the approaches/departures also act as speed reducer, vehicle director, and pedestrian refuge when crossing the street.

Congestion and Pollution Reduction

Intersection delay can be associated with a level of service (LOS) or a grade given to each intersection based on its operations. Table 1 shows the average delay thresholds associated with each LOS for stop-controlled intersections, roundabouts, and signalized intersections.

Table 2 Intersection Level of Service Ranges

Level of Service (LOS)	Stop-Controlled/ Roundabout Intersection	Signalized Intersection
	Average Delay per Vehicle (Seconds/Vehicle)	
A	Less than 10	Less than 10
B	10 – 15	10 – 20
C	15.1 – 25	20.1 – 35
D	25.1 – 35	35.1 – 55
E	35.1 – 50	55.1 – 80
F	Greater than 50	Greater than 80

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An LOS analysis was conducted for this intersection and it showed that in the 2-way stop controlled no-build condition, the intersection operates at an LOS F during peak periods. With a build option of a roundabout, this intersection will operate at an LOS C or D during peak periods in year 2039. A signal warrant analysis was also completed for this intersection using MUTCD Warrant 1, Eight-Hour Vehicular Volume and it was determined that this intersection does not meet the requirements necessary to signalize the intersection. This analysis means that the intersection with a roundabout will have a reduction in congestion because it will be efficient during both peak hours and other times, impose less delay on drivers, reduce pollution and fuel use, lead to fewer stops and fewer hard accelerations, and reduce the amount of time drivers spend idling.

Complementary to the Community

The Northside Dr at Riverview/Old Powers Ferry intersection is in a residential neighborhood. The posted speed limit on Northside Dr is 35MPH and the posted speed on Riverview/Old Powers Ferry is 25/30MPH, respectively. As previously mentioned, the introduction of a roundabout will reduce speeds to less than 25MPH throughout the intersection. A fastest path analysis for a single-lane roundabout at this intersection was performed and the analysis showed no speeds greater than 25MPH, which meets standard. The average speed through the roundabout was determined to be 19MPH.

Additionally, roundabouts can operate quieter than a four-way stop because of fewer start-ups and brakings by vehicles. Research has also shown that roundabouts can be very functional in lieu of other traffic control methods. A street must be classified as a local street or lower classification to qualify for traffic calming measures. Northside Drive is classified as an urban minor arterial, while Riverview Road and Old Powers Ferry Road are both classified as urban local collectors. As a result, traffic calming measures cannot be made at this intersection.

Finally, roundabout offer the opportunity to provide attractive entries or centerpieces to the community. A sustainable landscape design in the center of the proposed roundabout will be aesthetically pleasing and have a welcoming effect on the area.

Conclusion

The public usually has an initial fear or negative opinion of roundabouts, but that opinion changes after they've experienced their benefits. There is absolutely a learning curve with driving through a roundabout, but proper community outreach can help with the learning gap. Many neighboring jurisdictions have started implementing roundabouts into their road systems with great results, one example being the roundabout near Northridge Rd and Roberts Dr.

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Figure 5 Northridge Rd at Roberts Dr Roundabout



The City of Sandy Springs and their consultant have followed the FHWA guidelines for determining if the proposed intersection would most benefit from a roundabout. The City of Sandy Springs conducted a traffic study, an independent roundabout review, fastest path and truck turning analysis to FHWA standards. Safety for both vehicles and pedestrians was the driving factor in the decision for a roundabout. Crash rates and queuing during peak hours will be reduced. Sight distance through the roundabout will be an improvement from the existing 2-way stop and pedestrian crossings will be safer and shorter with the introduction of refuge islands and setting the crossings further away from the intersection.

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